CAAM 583/ELEC 533/STAT 583 : INTRODUCTION TO RANDOM PROCESSES AND APPLICATIONS Fall 2014

ELEC 533
Introduction to Random Processes and Applications

Behnaam Aazhang

MWF 11:00-11:50 am, Room Duncan Hall 1064

Fall Semester, 2015

Electrical and Computer Engineering

This is a graduate course on random processes which is designed to prepare students for graduate work in communications, networking, signal processing, and computer systems. The course covers basic concepts and useful analytical tools for engineering problems involving discrete and continuous-time random processes.

- ***Review of Basic Probability***: Probability spaces, random variables, distribution and density functions, expectation, characteristic functions, conditional probability, conditional expectation.

- ***Sequences of Random Variables***: Convergence concepts, laws of large numbers, central limit theorem.

- ***Random Vectors and Estimation:*** Random vectors, covariance characterization jointly Gaussian random variables.

- ***Basic Concepts of Random Processes:*** De nition and classi cation, stationarity and ergodicity, correlation functions, continuity, di erentiation, and integration of random processes.

- ***Random Processes in Linear Systems:*** Spectral analysis of random processes in linear systems, the orthogonality principle.

- ***Special Processes:*** Markov processes, Wiener Process, Poisson processes, shot noise, thermal noise.

- ***Spectral Representation of Random Processes:*** White-noise integrals, expansion of random processes.

- ***Applications:*** Signal detection and parameter estimation

Prerequisite: An introductory course in probability.

Recommended Textbooks: A textbook is not required. Copies of class notes will be provided.

- R.G. Gallager, Stochastic Processes: Concepts for Applications pdf online

- R.G. Gallager, Discrete Stochastic Processes, 2nd edition pdf online
- W.B. Davenport, Probability and Random Processes
- J.B. Thomas, An Introduction to Applied Probability and Random Processes
- E. Wong and B.E. Hajek, Stochastic Processes in Engineering Systems
- R. Ash, Real Analysis and Probability

HW's 25% + Quiz 15% + 1st exam 30% + 2nd exam 30% = 100 %

Graders:

- Xu Du xu.du@rice.edu
- Zhiting Cai zhiting.cai@rice.edu
- Andrew Kwong azk2@rice.edu
- Sudha Yellapantula sudha@rice.edu

Also, the first two books can be found in .pdf format in Resources.

ELEC 533 Timetable

Assignment	**Due Date**	Grader
Labor day	September 7	No class
Homework 1	September 4	Xu Du
Homework 2	September 11	Zhiting Cai
Quiz: Take home	September 18 (Friday)	Andrew Kwong
Homework 3	September 25	Sudha Y
Homework 4	October 2	Xu Du
Homework 5	October 9	Zhiting Cai
Mid-term recess	October 12 (Monday)	No class
First Examination: Take home	October 23 (Friday)	Andrew Kwong
Homework 6	October 30	Sudha Y
Homework 7	November 6	Xu Du
Homework 8	November 13	Zhiting Cai
Homework 9	November 20	Andrew Kwong
Thanksgiving recess	November 27 (Friday)	No class
Second Examination: Take home	December 4 (Friday)	Sudha Y